The impact on the New Brunswick
economy of government spending
to assist vessel replacement

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The impact on the New Brunswick economy of government spending to assist vessel replacement

Economic Research Unit
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FOREWORD

This study has been undertaken to estimate the broad economic impact on the New Brunswick economy of the operation of three representative fishing vessels through their useful lives. This impact has been compared to the subsidies provided by the provincial Department of Fisheries in the form of interest subsidy.

The figures provided are averages, and a number of broad approximations have had to be made. Data in this area is scanty. However, the approximations are based on such data that is available, and referenced accordingly. The figures give conclusions that are, I believe, approximately correct, although some individual figures are subject to question. The report, over-all, is at least a beginning in the economic analysis of the New Brunswick fishery.

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SUMMARY OF CONCLUSIONS

The following figures are estimates in real terms of the impact on the New Brunswick economy from the three activities concerned - boatbuilding, primary fishing and fish processing - for three representative vessels. Impact figures from analyses both using multipliers and not using them are given. The detailed analyses follow this summary.

Economic Impact with Multipliers

(i) 65' Scottish Seiners and Crabber

Total

Benefits	$9 601 081.00
Provincial Subsidy	$1 926 062.00

(ii) 63' Crabber

Total

Benefits	$9 180 178.00
Provincial Subsidy	$ 501 432.00

(iii) 45' Multipurpose Boat

Total

Benefits	$1 100 651.00
Provincial Subsidy	$ 2 672.00

The Multipliers

A series of multipliers have been calculated and are used in the following analysis. Their construction is explained in Appendix A. The values of the multipliers are as follows:

	Income	Employment
Boatbuilding	2.0	2.0
Primary Fishing	2.0	1.6
Fish Processing	4.6	3.9

These multipliers provide a ratio of total income generated to direct income, and total employment generated to direct employment.

Economic Impact Without Multipliers

(i) 65' Scottish Seiners and Crabber

	Total
Benefits	$3 333 695.00
Provincial Subsidy	$1 104 125.00

(ii) 63' Crabber

	Total
Benefits	$3 244 882.00
Provincial Subsidy	$ 344 150.00

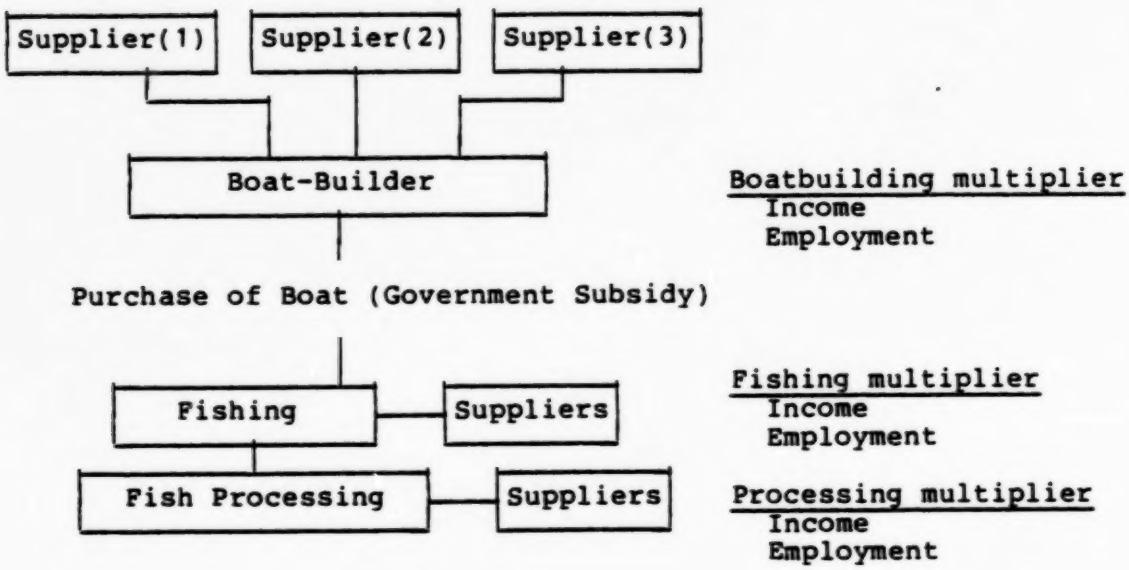
(iii) 45' Multipurpose Boat

	Total
Benefits	$ 399 190.00
Provincial Subsidy	$ 1 706.00

Introduction

The purpose of this study is to estimate the impact on the New Brunswick economy of the provincial government subsidy towards boat purchases administered by the Fisheries Development Board. The provision of this subsidy is one part (presumably a necessary part) in the entire process which makes up the fishery in New Brunswick. A schematic outline of this process is given in Table I.

TABLE I



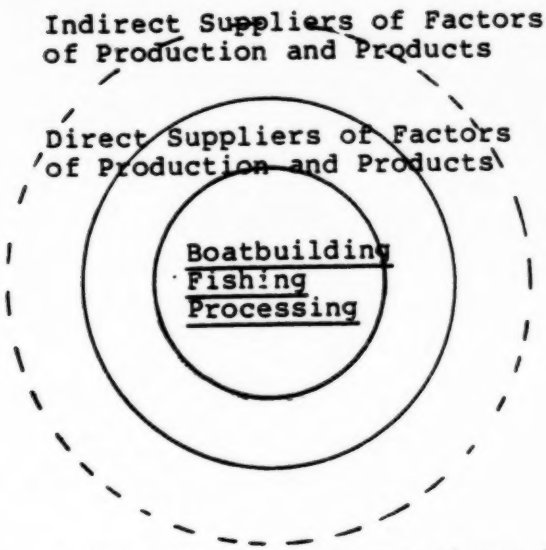
It is intended that the initial government injection can be linked, via the principle of the Keynesian Multiplier, to its ultimate economic impact, in terms of dollar amount and employment, on the New Brunswick economy. Given the amount of the injection, what is the magnitude of the changes in income that will result in the provincial economy as a result of its application?

The operation of a vessel is made viable economically, through a government subsidy on interest payments. On the larger boats an implied subsidy is included through the use of the Pay-as-you-go system of repayment, by which the provincial government acts as a shareholder in the annual fishing operation, and shares the risks of the venture with the fishermen. The federal government subsidy available for new boat construction, 25% of purchase price up to a maximum of $100 000 on a wooden boat and $125 000 on a steel one, is included in the purchase price.

Obviously, the purchase of a boat implies its construction, and, then, its operation in the fishery. Supplies are purchased and employment generated, both directly and indirectly, at each stage of operations - boatbuilding, boat operation, and fish processing. The input of each stage of operation provides both backwards and forwards linkage, as does the multiplier in the various production stages.

Direct employment and income is created by the series of expenditures involved, as the expenditures involve supplies and services created locally. These direct expenditures are then transmitted through the economy via a series of linkages which originate as a result of the initial purchases. A new part of the network of exchange is created. As the process recedes further into the network, more and more different types of industry and activity become involved. Table II illustrates this series of linkages.

TABLE II



At each stage or link in the process there is an effect on consumption, and the creation of additional jobs due to the accrued income. This is the induced consumption multiplier. The indirect, or secondary linkages, are only partially included here, but their significance is relatively small and declines rapidly in successive rounds of spending. Therefore, the impact loss of their exclusion is a minor one.

In fisheries, a series of multipliers can be calculated. There is the traditional government injection of a subsidy in the purchase of the vessel. This is a one-time, "pump-priming" type of expenditure. If the vessel purchased is constructed in New Brunswick, then the impact on the local economy is considerably more significant than if it were constructed elsewhere. It is assumed that the boats described in this study as examples were constructed in New Brunswick. Thus, both an increase in provincial income and employment results.

Then, the impact of the operation of the vessel results in annual purchases of equipment and supplies, and the creation of employment through the useful life of the vessel which is calculated according to the material used in the construction of the hull. For example, wooden boats have a life expectancy of 20 years, steel and fiberglass, of about 25 years. This multiplier involves a longer-run series of repetitive smaller expenditures.

Finally, the fish landed must be processed, and a very high proportion of fish landed in the province receive some degree of processing here. Thus, a mulitplier for processing can be created that quite legitimately assesses the increase in provincial income and employment given the supply of fish from a single boat on an annual basis.

It is simpler to assume that the new jobs created by the multipliers are given to people who would otherwise not be employed and, as a result, would have no alternate income. The first part of this statement is probably correct, given the chronically high rates of unemployment in the fishing areas of the province. However, it would be unrealistic to assume that transfer payments from UIC and social security payments are not involved, given the extent of use of these income supplements by people in the fishing industry. However, the gain of employment, while it eliminates the use of transfer payments immediately, re-qualifies or qualifies employees for future transfer payments. It is felt therefore that the immediate loss of transfer payments through employment can be ignored given their future re-instatement. Thus, the direct and indirect income effects of a unit change in final demand are based upon the basic assumption, that, besides changes in the final demand of a given sector, all other final demands remain constant.

Additional assumptions underlie the analysis. The dollars represented are 1983 dollars and inflation is ignored. This assumption is qualified only in the calculation of the interest subsidy provided by the province. Here, the method used by the Financial Analysis Section of the Fisheries Development Board is employed. Thus, simple interest is calculated, and no interest is charged on unpaid interest. This method, one of many that could be used, understates the cost to the province of this subsidy. Likewise, the total revenue realized by the vessels is grossed up by 10% per year. There is some disastisfaction currently with these assumptions, but they are presently in use.

In the "multiplier" part of the analysis, benefits are discounted to present value and costs through time, i.e., the interest subsidy, are not brought to present value. There is a kind of "rough justice" in this approach in that the calculation of the interest subsidy, as has just been explained, is under-valued as a cost to the province. Thus, the inconsistences tend to cancel each other out. In addition, a fairly pessimistic rate of 15% is used to represent the average borrowing rate to the province over the next 25 years.

In the "Benefit-Cost" analysis, both the benefit and cost streams are discounted to present value, and the multiplier is not used in the calculations.

A number of people have provided assistance to this study. In particular, Michael MacFarlane, the Financial Analyst with the Fisheries Development Board, provided some of the figures for boatbuilding and Joe Gallant, Commerce & Development, and André Pelletier, the Statistician with the Resource and Policy Planning Division, Fisheries, provided some figures used in making estimates for fish processing. Brian MacDonald, Senior Economist, Finance, provided some advice on the taxation estimates. Needless to say, the responsibility for the work remains that of the author.

Economic Impact with Multipliers

The following are estimated values for the multiplicands for the three activities involved - boatbuilding, primary fishing and fish processing. The estimates are then adjusted on the basis of the multipliers. A comparison is offered between the cost to the province of subsidizing the construction and operation of the fishing fleet, and the benefits that eventually accrue to the province as a result of the economic activities that result. Similar comparisons are made in primary fishing and fish processing.

Three vessel types were chosen in order to permit concrete examples. These are: (i) 65' Scottish Seiner and Crabber (ii) 63' Crabber and (iii) 45' Multipurpose Boat.

Boatbuilding

(i) 65' Scottish Seiner and Crabber

- (a) Life of Boat (Steel hull): 25 years
- (b) Price: $1.2 million
- (c) Cost of Construction: $1.05 million
- (d) Profit (~12%): $150 000.00
- (e) Cost of Materials: $621 104.00
- (f) Labour: $243 000.00 (18,000 man-hours @ $13.50/hr.)
- (g) Overhead: $185 896.00
- (h) Federal Subsidy: $125 000.00
- (i) Provincial Subsidy: $15 000.00
- (j) Provincial Interest Subsidy:* $1 911 062.00
- (k) Down Payment: $53 000.00 (5% of price minus subsidies)

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*Calculation of (j) Provincial Interest Subsidy. The value represented was arrived at by calculating the cost to the province for its share of the interest, calculated as simple interest. Appendix B contains a representation of the fiscal cost.

(ii) 63' Crabber

(a) Life of Boat (Wooden hull): 20 years
(b) Price: $750 000.00
(c) Cost of Construction: $660 000.00
(d) Profit (~12%): $90 000.00
(e) Cost of Materials: $396 000.00
(f) Labour: $157 950.00 (11,700 man-hours @ $13.50/hr.)
(g) Overhead: $106 050.00
(h) Federal Subsidy: $100 000.00
(i) Provincial Subsidy: $10 000.00
(j) Provincial Interest Subsidy*: $491 432.00
(k) Down Payment: $32 000.00 (5% of price minus subsidies)

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*See Appendix C for calculation of (j) Provincial Interest Subsidy.

(iii) 45' Multipurpose Boat

(a) Life of Boat (Wooden hull): 15 years
(b) Price: $50 000.00
(c) Cost of Construction: $44 720.00
(d) Profit (~12%): $5 280.00
(e) Cost of Materials: $24 596.00
(f) Labour: $8 640.00 (640 man-hours @ $13.50/hr.)
(g) Overhead: $6 204.00
(h) Federal Subsidy: $12 500.00
(i) Provincial Subsidy:
(j) Provincial Interest Subsidy:* $2 672.00
(k) Down Payment: $1 875.00 (5% of price minus subsidies)

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*See Appendix D for calculation of (j) Provincial Interest Subsidy.

Benefits to the New Brunswick Economy from Boatbuilding

(i) 65' Scottish Seiner and Crabber

Benefits

Direct		Indirect	
Income[1]	Employment	Income	Employment
$622 417	15 man-years	$622 417	15 man-years

Total

Income	Employment
$1 244 834	30 man-years

Provincial Government Subsidies

(i)	$ 15 000
(j)	$1 911 062
Total	$1 926 062

1. Estimated on the basis of (f) Labour, (d) Profit, 10% (e) Cost of Materials, 90% (g) Overhead.

(ii) 63' Crabber

Benefits

Direct		Indirect	
Income	Employment	Income	Employment
$382 995	10 man-years	$382 995	10 man-years

Total

Income	Employment
$765 990	20 man-years

Provincial Government Subsidies

(i)	$ 10 000
(j)	$491 432
Total	$501 432

(iii) 45' Multipurpose Boat

Benefits

Direct		Indirect	
Income	Employment	Income	Employment
$21 964	1 man-year	$21 964	1 man-year

Total

Income	Employment
$43 928	2 man-years

Provincial Government Subsidies

(i)	-
(j)	$2,672
Total	$2 672

Primary Fishing

(i) 65' Scottish Seiner and Crabber

(a) Average Annual Catch (1983): $244 386.00

Quantities and Values by Species:

Cod - 197,392 lbs.,	$41 078.00
Hake - 4,973 lbs.,	$684.00
Plaice - 48,678 lbs.,	$8 546.00
Queen Crab - 564,215 lbs.,	$194 078.00

(b) Average Annual Fishing Expenses (1983): $52 318.00

Supplies: $40 771.00

Maintenance and Repairs: $8 881.00

Fixed Costs: $2 666.00

(c) Average Labour Costs (1983): $110 007.00 (5 man-years)

(d) Profit: 0

Benefits (1983)

Direct		Indirect	
Income[1]	Employment	Income	Employment
$162 325.00	5 man-years	$162 325.00	3 man-years

Total

Income	Employment
$324 650.00	8 man-years

Total Present Value of Benefits Over The Life of the Boat (25 years) Assuming A 10 Percent Discount Rate

Income	Employment
$3 241 604.00	200 man-years

1. Total of i (b), (c) and (d)

(ii) 63' Crabber

(a) Average Annual Catch (1983): $230 039.00

Quantities and Values by Species:

Cod - 88,434 lbs., $20 614.00

Hake - 1,180 lbs., $172.00

Plaice - 25,483 lbs., $4 817.00

Queen Crab - 604,384 lbs., $204 436.00

(b) Average Annual Fishing Expenses (1983): $73 516.00

Supplies: $42 308.00

Maintenance and Repairs: $18 042.00

Fixed Costs: $13 166.00

(c) Average Labour Costs (1983): $97 844.00 (4 man-years)

(d) Profit: $36 206.83

Benefits (1983)

Direct		Indirect	
Income[1]	Employment	Income	Employment
$207 566.00	4 man-years	$207 566.00	2.4 man-years

Total

Income	Employment
$415 132.00	6.4 man-years

Total Present Value of Benefits Over The Life of the Boat (20 years) Assuming A 10 Percent Discount Rate

Income	Employment
$3 888 421.00	128 man-years

1. Total of ii (b), (c) and (d)

(iii) 45' Multipurpose Boat

(a) Average Annual Catch (1983): $31 735.00

Quantities and Values by Species:

Lobster - 6,178 lbs.,	$12 407.00
Herring - 44,003 lbs.,	$5 997.00
Mackeral - 15,084 lbs.,	$1 811.00
Cod - 980 lbs.,	$269.00
Plaice - 561 lbs.,	$68.00
Hake - 11,394 lbs.,	$2 343.00
Alewife - 14,047 lbs.,	$958.00
Scallops - 1,373 lbs.,	$7,791.00
Cancer Crab - 635 lbs.,	$91.00

(b) Average Annual Fishing Expenses (1983): $11 616.00

Supplies: $7 601.00

Maintenance and Repairs: $2 954.00

Fixed Costs: $1 061.00

(c) Average Labour Costs (1983): $15 284.00 (1.25 man-years)

(d) Profit: $4 409.00

Benefits (1983)

Direct		Indirect	
Income[1]	Employment	Income	Employment
$30 949.00	1.25 man-years	$30 949.00	1.25 man-years

Total

Income	Employment
$61 898.00	2 man-years

Total Present Value of Benefits Over The Life of the Boat (15 years) Assuming A 10 Percent Discount Rate

Income	Employment
$517 901.00	30 man-years

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1. Total of iii (b), (c) and (d)

Fish Processing

The average quantity and value per year of fish landed from the boats under study can be estimated from the primary fishing figures. It is required to calculate the additions, both direct and indirect, to income and employment created as the result of the processing of this fish. To ease this analysis, the fish landed has been generalized into five categories. A few minor species, caught in small amounts by the multi-purpose boat, have been ignored.

Total Average Fish Landings (1983) from Three Representative Vessels

(i) 65' Scottish Seiner and Crabber

Species	Quantity (lbs.)	Value ($)
Crab	564,215	194,078
Groundfish	251,043	50,308

(ii) 63' Crabber

Species	Quantity (lbs.)	Value ($)
Crab	604,384	204,436
Groundfish	115,097	25,603

(iii) 45' Multipurpose

Species	Quantity (lbs.)	Value ($)
Groundfish	12,935	2,680
Crustaceans	7,551	20,198
Pelagics	73,134	8,766

We know that raw material represents something in the order of 55-60% of the cost of sales. There are wide variations depending on the species involved but an estimate of the total value of the cost of sales can be calculated from the cost of raw materials. Direct labour costs (plant wages) typically contribute 20 to 25 percent of cost for filleted products. Packaging and manufacturing materials contribute approximately 5 percent, while manufacturing over-head accounts for roughly 15 to 20 percent. Of this over-head, labour costs for supervisory and management personnel are the most important components -- roughly 40 percent. Maintenance materials and utilities contribute about 20 to 25 percent each.[1]

Table VI gives the operating cost structure of the Atlantic fish processing industry based on yearly tabulations by Statistics Canada.

TABLE III

Operating Costs, Fish Processing

(% of Sales Dollar)

	1971	1980
Materials & Supplies	59.5	62.8
Energy	1.9	2.6
Wages	19.1	21.5
Margin	19.5	13.1

Source: SCC 32-216 and 32-227.

1. Navigating Troubled Waters (Kirby Report). Preliminary, Ottawa, Supply & Services, 1983, pp. 96-99.

Applying the operating cost percentages to the raw material estimated to be landed in 1983, gives the following results:

(i) 65' Scottish Seiner and Crabber

Components	%	Value ($)
(a) Materials	62.8	244,386
(b) Energy	2.6	10,118
(c) Wages	21.5	83,667
(d) Margin	13.1	50,979

(ii) 63' Crabber

Components	%	Value ($)
(a) Materials	62.8	230,039
(b) Energy	2.6	9,524
(c) Wages	21.5	78,755
(d) Margin	13.1	47,986

(iii) 45' Multipurpose Boat

Components	%	Value ($)
(a) Materials	62.8	31,644
(b) Energy	2.6	1,310
(c) Wages	21.5	10,836
(d) Margin	13.1	6,601

The income components of the operating costs are used to calculate 1983 direct and indirect benefits, and the total benefit stream discounted to present value over the life of the boat.

Benefits to the New Brunswick Economy from Fish Processing

Benefits 1983

Direct		Indirect	
Income[1]	Employment[2]	Income	Employment
$109 156.00	9.2 man-years	$392 961.00	26.8 man-years

Total

Income	Employment
$502 117.00	36 man-years

Total Present Value of Benefits Over the Life of the Boat (25 years) Assuming a 10 Percent Discount Rate

Income	Employment
$5 014 643.00	900 man-years

1. (i) (c) and 50% (i) (d).
2. This figure was estimated on the basis of $5/hour for plant workers, and $10/hour for supervisory personnel.

(ii) 63' Crabber

Benefits 1983

Direct		Indirect	
Income[1]	Employment[2]	Income	Employment
$102 748.00	9 man-years	$369 893.00	26 man-years

Total

Income	Employment
$472 641.00	35 man-years

Total Present Value of Benefits Over the Life of the Boat (20 years) Assuming a 10 Percent Discount Rate

Income	Employment
$4 426 757.00	700 man-years

1. (ii) (c) and 50% (ii) (d).

2. This figure was estimated on the basis of $5/hour for plant workers, and $10/hour for supervisory personnel.

(iii) 45' Multipurpose Boat

Benefits 1983

Direct		Indirect	
Income[1]	Employment[2]	Income	Employment
$14 136.00	1.2 man-years	$50 890.00	3.5 man-years

Total

Income	Employment
$65 026.00	4.7 man-years

Total Present Value of Benefits Over the Life of the Boat (15 years) Assuming a 10 Percent Discount Rate

Income	Employment
$526 322.00	70 man-years

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1. (iii) (c) and 50% (iii) (d).

2. This figure was estimated on the basis of $5/hour for plant workers, and $10/hour for supervisory personnel.

Total Impact on the New Brunswick Economy

The following estimates provide a basis to assess impact on the economy in comparison to the amount of provincial subsidy. The figures were provided to assess this impact on the basis of the operation of specific vessel types. The following are the total benefits from all three fishing-related activities for the vessel types with the use of multipliers.

(i) 65' Scottish Seiner and Crabber

Boatbuilding

Benefits	Provincial Subsidy
$1 244 834.00	$1 926 062.00
$100 000.00 - Federal Subsidy	

Primary Fishing

Benefits	Provincial Subsidy
$3 241 604.00	0

Fish Processing

Benefits	Provincial Subsidy
$5 014 643.00	0

TOTAL

Benefits	$9 601 081.00
Provincial Subsidy	$1 926 062.00

(ii) 63' Crabber

Boatbuilding

Benefits	Provincial Subsidy
$765 000.00	$501 432.00
$100 000.00 - Federal Subsidy	

Primary Fishing

Benefits	Provincial Subsidy
$3 888 421.00	0

Fish Processing

Benefits	Provincial Subsidy
$4 426 757.00	0

TOTAL

Benefits	$9 180 178.00
Provincial Subsidy	$ 501 432.00

(iii) 45' Multipurpose Boat

Boatbuilding

Benefits	Provincial Subsidy
$43 928.00	$2 672.00
$12 500.00 - Federal Subsidy	

Primary Fishing

Benefits	Provincial Subsidy
$517 901.00	0

Fish Processing

Benefits	Provincial Subsidy
$526 322.00	0

TOTAL

Benefits	$1 100 651.00
Provincial Subsidy	$ 2 672.00

It is obvious that the province of New Brunswick enjoys a considerable economic benefit from its subsidization of fishing vessel construction. On the large boats, the boatbuilding phase shows a loss, or a small positive return. However, this phase is the means to realizing significant returns on the Primary Fishing and Processing Phases.

In considering the three example vessel types, the benefits to the province decrease with an increase in the size of the boat. For every dollar invested by the province as a subsidy for the smaller inshore vessel, the province receives a return in both direct and indirect incomes, of more than $400.00. For the larger boats, an investment of one dollar in the 63' Crabber, return eighteen dollars, and the 65' Seiner and Crabber returns five dollars. Present market conditions favor the operation of the smaller boats over the larger ones. This conclusion was also reached by the Kirby Commission Report. Present short-term conditions make smaller boats more economically viable. However, it would be impossible to maintain the processing sector on the basis of landings from the inshore fleet above. In addition, certain very profitable species are inaccessible to the inshore fleet. There is also a quality consideration that makes it necessary to maintain a mid-shore fishery.

As can be seen from the preceding analysis, the province receives significant return from the subsidization of both mid-shore and inshore vessels. Both the employment, and employment income are sizable in relation to the amounts invested. The province receives a very large sum from the combined activities considering the amounts invested to support vessel replacement.

Benefit - Cost Analysis

The use of a multiplier in the assessment of economic impact is beset by theoretical and practical difficulties. In the present analysis, its use is more justifiable than usual because the fishing industry is pre-dominant in those areas of the province - the North-East, and South-West - where unemployment is chronically very high, and the underutilization of resources is, therefore, obvious.

However, an alternative analysis of economic impact in terms of a Benefit - Cost Analysis offers some additional insight into the impact of vessel replacement in the New Brunswick economy. A rather specialized Benefit - Cost Analysis follows in which the benefits are those of direct income, and costs are those to the province of subsidization of boatbuilding and boat-financing. This analysis is designed to illustrate the relationship between the direct cost to the province of vessel subsidization and direct benefit in terms of value of income, interpreted to include wages and profits. Multipliers are not used. The assumptions of the analysis follow.

Assumptions

The analysis is in 1983 dollars. It makes no allowances for either inflation or deflation, i.e., the benefits and costs are in real terms. Average costs and benefits are used rather than marginal costs and benefits. The only alternatives developed are contained in the comparison of vessel types, since the only way to land most species of fish in New Brunswick is through the use of vessels. A multiplier effect on income is not employed. The vessel types are assessed on the basis of net present value. Costs, in this study, are considered to be solely the cost to the Province of New Brunswick of subsidizating the vessel construction and financing. Benefits are the direct income figures, which include the wages and profits generated by the enterprise.

(i) 65' Scottish Seiner and Crabber

Benefits

Boatbuilding	$ 622 417.00
Primary Fishing	$1 621 138.00
Fish Processing	$1 090 140.00
Total	**$3 333 695.00**

Costs

Boatbuilding	$1 104 125.00
Primary Fishing	--
Fish Processing	--
Total	**$1 104 125.00**

Benefit to Cost Ratio: 3.02

(ii) 63' Crabber

Benefits

Boatbuilding	$ 382 995.00
Primary Fishing	$1 914 288.00
Fish Processing	$ 947 599.00
Total	**$3 244 882.00**

Costs

Boatbuilding	$ 344 150.00
Primary Fishing	--
Fish Processing	--
Total	**$ 344 150.00**

Benefit to Cost Ratio: 9.43

(iii) 45' Multipurpose Boat

Benefits

Boatbuilding	$ 21 964.00
Primary Fishing	$ 258 950.00
Fish Processing	$ 118 276.00
Total	**$ 399 190.00**

Costs

Boatbuilding	$ 1 706.00
Primary Fishing	--
Fish Processing	--
Total	**$ 1 706.00**

Benefit to Cost Ratio: 233.99

In real terms, with all time series discounted to present value, the province benefits by the construction of the three vessel types as all the ratios are positive. The analysis indicates a very high return from the operation of the mid-shore vessels, and an exceptionally high return from the operation of the inshore boat.

TAXATION

There is one additional impact to consider on the economy from the activities that make up the New Brunswick fishery, this is the matter of the taxes generated by the various activities. The following are estimates of these revenues:

Boatbuilding

There is no retail sales tax on either boats or gear. The only taxes that are generated in this phase are the federal and provincial income tax, and corporate tax.

(i), (ii) & (iii) - 3 vessels

Total Labour costs (1983): $707 740.00
Provincial Income Tax: $139 566.00
Federal Income Tax: $240 632.00

Total Profits (1983): $245 280.00
Corporate Tax: $34 339.00

Primary Fishing

There is no retail sales tax on fishing supplies. Income tax and corporate tax are generated in this phase.

(i), (ii) & (iii) - 3 vessels

Total Labour Costs (1983): $223 135.00
Provincial Income Tax: $44 002.00
Federal Income Tax: $75 866.00

Present Value Over the Life of the Boats of Total Income Tax

Provincial: $422 584.00
Federal: $763 076.00

Total Profits (1983): $40 615.00
Provincial Corporate Tax: $5 686.00

Present Value Over the Life of the Boats of Total Corporate Tax: $52 639.00

Fish Processing

(i), (ii) & (iii) - 3 vessels

Total Labour Costs (1983): $173 258.00
Provincial Income Tax: $34 167.00
Federal Income Tax: $58 908.00

Present Value Over the Life of the Boat of Total Income Tax

Provincial: $343 659.00
Federal: $565 737.00

Total Profits (1983): $105 566.00
Corporate Tax: $14 779.00

Present Value Over the Life of the Boats of Total Corporate Tax: $136 819.00

These figures give a very rough indication of the tax incomes generated by three representative vessels in the New Brunswick fishing industry.

CONCLUSION

The illustration of returns from single boat types in the New Brunswick fishery obviously indicates that the province enjoys considerable benefits from the operation of its fishing fleet. This conclusion is valid whether or not multipliers are used in the analysis.

There is one qualification of this conclusion. It holds in the event that the fishery is well-managed. That is, positive returns are enjoyed by the province when the fishing fleet is maintained at, or near, optimal size in relation to the availability of stock, the amount of fishing effort, the capacity of the processing sector, and the availability of adequate markets for the product. Thus, investment by the province in vessels for replacement or expansion will benefit the provincial economy significantly within the constraint that the fishery is well-managed.

APPENDIX A
Construction of Multipliers

Multipliers are calculated either on the basis of the Keynesion income determination model, or an economic base model. All calculations share the assumption that successive rounds of spending reduce the impact of the original injection of funds due to leakages, which consist of imports into the region, personal savings and taxation. Thus, a smaller and smaller amount is re-spent on domestic output in successive rounds of spending. The withdrawals from each round of income earned reduce each subsequent round of spending on domestic output until eventually extra spending and income creation fall to zero.

This process takes the form of a geometric progression. If ΔJ represents the initial increase in domestic spending and b the share of each extra dollar of income spent on domestic output, then ΔY, the change in national income, would be

$$\Delta Y = \Delta J + b\,\Delta J + b^2\Delta J + \ldots + b^n\Delta J = \frac{\Delta J}{1-b}$$

The multiplier K is then

$$K = \frac{\Delta Y}{\Delta J} = \frac{1}{1-b}$$

The multiplier K will be greater than 1 if b is greater than zero. Since b is normally positive but less than 1, a change in autonomous spending of ΔJ will produce a change in national income of ΔY, where ΔY is some multiple of ΔJ equal to $K\Delta J$. The change in national income can be broken down into two parts; the part associated with the initial change in autonomous spending, or the multiplicand (ΔJ), and the part associated with the indirect spending, or the secondary effects [$\Delta J\ (K-1)$].

There are two ways in which a change in the final demand for a product can influence demand for other products.

(a) All increases in output tend to changes in demand on investment expenditures for plant and equipment. This results in an acceleration effect on income.

(b) An initial increase in production and income leads to subsequent increases in personal spending. This, in turn, sets in motion a series of inter-industry reactions, increasing output and income even further and leading to a still further increase in personal expenditures. This is the traditional Keynesian consumption multiplier.

In other words, a change in final demand results in two related and mutually interreacting events. First of all, it results in greater output and generation of additional direct income. Secondly, it leads to additional consumption expenditures which, in turn, generate changes in production income in succeeding rounds. The total income thus generated due to a change in final demand can be termed direct, indirect, and induced income, as the impact proceeds through the exchange network from the original expenditure into ever-widening sectors of influence.

The size of the multiplier, and therefore the total economic impact of the initial expendure, depends on the leakage, that is, the amount of the total expenditure which eventually leaves the province, thereby withdrawing from the impact process. There are certain basic factors of consumption spending patterns in the Atlantic region which help to identify the parameters upon which the regional multiplier is based.[1]. First of all, the import content of purchases in the region.

1. Levitt, Kari, "A Macro-economic Analysis of the Structure of the Economy of the Atlantic Provinces 1960, "Canadian Economics Association, June 1969.

TABLE A-I

Import Content of Purchases, Atlantic Provinces, 1960
(% of Total)

	Nfld.	PEI	N.S.	N.B.
Personal Consumption Expenditures	70.4	64.3	57.7	54.7
Private Capital Formation	79.3	83.5	74.9	75.4
Federal Govt. Civilian Purchase	68.9	69.2	54.5	53.1
Provincial Public Expenditures	71.9	69.9	61.1	62.7

Source: Levitt, op. cit., Table 12.

This gives a good idea of where the dollars disappear to, once the initial purchase is made. For example, in the case of personal consumption expenditures in Nova Scotia, the import content was 57.7%, compared with 70.4% for Newfoundland and 54.7% in New Brunswick. Prince Edward Island had an import content of 64.3% in the case of personal spending.

Looking at the private capital formation sector, the import content was significatly higher. In the case of Prince Edward Island, which is virtually without any secondary manufacturing industry, the ratio was 83.5%, while the other provinces ranged from 74.9% in Nova Scotia to 79.3% in Newfoundland. The New Brunswick value was 75.4%.

Turning next to Federal Government civilian purchases, the ratio ranged from 53.1% in New Brunswick to a high of 69.2% in Prince Edward Island. Nova Scotia had a relatively low ratio, 54.5%, while Newfoundland had an import content of 68.9% in Federal Government purchases.

Finally, spending by the Provincial Governments. The import content ranged from 61.1% in Nova Scotia to a high of 71.9% in Newfoundland, and 62.7% in New Brunswick. The significances of these ratios is clear -- the higher the import content ratio, the greater the leakage in the initial spending round, and consequently the smaller the overall economic impact.

Since a large percentage of the economic impact under study is derived from the expanding of activities in the private sector, ratios concerning the income and development derived from private investment in the region are also of interest.

TABLE A-2

Income and Employment Derived from Private Investment, 1960
(% of Total)

	Income	Employment
Newfoundland	18.3	17.8
Prince Edward Island	11.3	10.9
Nova Scotia	13.6	13.8
New Brunswick	12.9	13.6

Source: Levitt, op. cit., Table 10

Looking first at income, the ratio ranges from a low of 11.3% in Prince Edward Island, to a high of 18.3% in Newfoundland. Nova Scotia had a ratio of 13.6% and New Brunswick 12.9%. These ratios represent the share of total income derived from private investment in the Province.

Turning next to employment, the ratios moved in roughly the same range, again with Prince Edward Island having the smallest ratio, and Newfoundland the largest. These were, respectively, 10.9% and 17.8% The Nova Scotia and New Brunswick ratios were similar, namely 13.8% and 13.6%. This means that in Nova Scotia only 13.8% of jobs were created by the impact of private investment expenditures in 1960.

Finally, the income and employment derived from personal spending in the region are significant.

TABLE A-3

Income and Employment Derived from Personal Expenditures, 1960

(% of Total)

	Income	Employment
Newfoundland	9.4	9.0
Prince Edward Island	11.3	12.4
Nova Scotia	8.0	7.7
New Brunswick	9.3	8.7

Source: Levitt, op. cit., Table 10.

Looking again at income, the ratio ranged from 8.0% in Nova Scotia to a high of 11.3% in Prince Edward Island. The other two provinces were very close: 9.3% in New Brunswick and 9.4% in Newfoundland.

Looking next at employment created by personal expenditures, 7.7% of all employment originated in this sector in Nova Scotia, and 12.4% in Prince Edward Island. New Brunswick had a ratio of 8.7% and Newfoundland 9.0%.

Summarizing these factors, it is clear that the Atlantic Provinces suffer a major leakage in most sectors of expenditures. It is also evident that the ratio of total income and employment generated to-date by private investment and personal spending is relatively minor.

One major reason for these small relative contributions is the predominant role of Federal expenditures in sustaining income and employment in the region. For example, 30.5% of income and 29.8% of employment in Nova Scotia are sustained by Federal expenditures.[1] Dependence of income on Federal expenditures was almost as high in Prince Edward Island, 27.3%. The stronger resource base of New Brunswick and Newfoundland is reflected in significantly lower dependence on Federal Government outlays. Income attributable to Federal Government spending was 19.5% in both these provinces.

The accuracy of a multiplier can be no greater than the reliability of the statistical base. This has presented a problem in the past, but several comprehensive studies have been done in attempting to evaluate the regional multipliers for the Atlantic Provinces. Generally the most appropriate method seems to have been the input/output matrix system, and on the basis of this methodology several basic conclusions have been reached.

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1. Levitt, op. cit., Page 39.

First of all, it is the primary sectors which generate relatively higher direct incomes per unit of output. These sectors predominate even when the total direct, indirect and induced income effects in each sector are compared. Secondly, the multipliers are highest for fish processing, manufacturing, pulp and paper, and sawmilling in each province. Construction and mining rank next in importance. The multiplier effects of primary industries like agriculture, fishing and forestry, rank the lowest. Thirdly, of the Atlantic Provinces, Nova Scotia has the highest multipliers for each sector. This is to be expected, as industrial activity is relatively more advanced in this province. Finally, the consumption multiplier has a fairly large value in each province:Nova Scotia 1.48, New Brunswick 1.44, and Newfoundland 1.43.[1] These results indicate that the region has a fairly large consumption-oriented economic activity, and that this activity is quite significant in spite of a large income leakage due to imports of consumption goods.

Another multiplier based upon an input/output matrix arrives at the following values: Nova Scotia 1.42, New Brunswick 1.43, Newfoundland 1.41, and Prince Edward Island 1.36.[2] The interpretation of this multiplier indicates that generation of $1 million of personal income implies further indirect generation of $430 thousand of personal income in New Brunswick, in the production of consumer goods and services and associated intermediate goods. Looking at

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1. Bhalla, G.S., "Sectoral Income Multipliers in the Atlantic Provinces." 1968.

2. Leavitt, Op. Cit., page 38.

this another way, $1 million of factor income received by New Brunswick residents from export production generated an additional $430 thousand of income in industries directly or indirectly supplying consumer goods and services.

These multipliers for individual provinces would tend to be lower than a regional multiplier itself, and this has been calculated at 1.47.[1] The reason for this increase implies a smaller leakage for the larger area involved. The region as a whole is somewhat less dependent upon imports than the individual provinces. Consequently the multiplier moves from an average of about 1.43 for the provinces, to a regional value of 1.47.

These multipliers were based upon 1960 data, and there was not any significant change in the 1965 tables. It has, however, been assumed that the region has succeeded in curtailing some of the leakage over the decade of the 1970's. In other words, the 1980 multiplier would be somewhat above the 1960 estimates. Furthermore, it is assumed that the multiplier would be increased even further, on the basis of economic activity induced by the proposed expenditures. Therefore, as a result of these historical multiplier calculations, and the assumed evolution of the economy since 1960, a general multiplier for New Brunswick could be set no higher than 1.5.

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1. Miller, F.C., The Case For Regional Fiscal Policy in Canada, Canadian Economics Association, June 1971.

Industry-specific multipliers have also been determined for the province. These follow[1].

	Income[2]	Employment[2]
Boatbuilding	2.0	2.0
Primary Fishing	2.0	1.6
Fish Processing	4.6	3.9

Thus, for every dollar of direct income created in boatbuilding, an additional dollar of indirect income is created, and for each job created in primary fishing, an additional job is created in the economy; and so on for the other categories.

These figures should be used carefully, and with a fair degree of skepticism. Multiplier values are essentially arbitrary assumptions, which, at best, can give an order of magnitude, rather than a specific economic impact. I believe that the values determined above are roughly appropriate, and are conservative ones under the circumstances but they should be intepreted carefully. With the exception of fish processing, the absence of a significant industrial base in New Brunswick results in fairly small values for the remaining multipliers.

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1. Levitt, Kari, op. cit., Tables 16-19

2. Ratios of Total Income generated to Direct Income, and Ratio of Total Employment generated to Direct Employment.

APPENDIX B

CALCULATION OF THE COSTS OF VESSEL FINANCING

(i) 65' Scottish Seiner and Crabber

YEAR	ANNUAL GROSS INCOME	ACCUMULATED YEARLY REVENUE (20%) DEDUCTED AT SOURCE	ACCUMULATED YEARLY (7½%) INTEREST		ANNUAL INSURANCE PREMIUM	PAYMENT AGAINST CAPITAL	OUTSTANDING CAPITAL 1 007 000
			Unpaid Yearly Interest				
1	259 910	51 982		75 525	9 000		
2		57 180	32 543	75 525	"		
3		62 898	59 888	75 525	"		
4		69 188	81 515	75 525	"		
5		76 107	96 852	75 525	"		
6		83 718	105 270	75 525	"		
7		92 090	106 077	75 525	"		
8		101 299	98 512	75 525	"		
9		111 429	81 738	75 525	"		
10		122 572	54 834	75 525	"		
11		134 829	16 787	75 525	"	33 517	973 483
12		148 312		73 011	"	66 301	907 182
13		163 143		68 039	"	86 104	821 078
14		179 457		61 581	"	108 876	712 202
15		197 403		53 415	"	134 988	577 214
16		217 143		43 291	"	164 852	412 362
17		238 857		30 927	"	198 930	213 432
18		238 439		16 007	"	213 432	0
19							
20			Interest Total: $1 911 062				

NOTES

Annual Gross Income:

Established from the figures provided by Eudore Dugas. Study of Fishing Operations in New Brunswick - 1981. The average figures provided in this study, are increased 10% per year to arrive at the figure for 1983, and so on.

Accumulated Yearly Revenue Deducted at Source:

20% of the Annual Gross Income.

Assumptions:

(1) No interest is charged on accumulated interest in the early years when payments are not adequate to cover interest payments.

(2) The annual insurance premium is estimated to give an average cost.

(3) No amount for maintenance and repairs is included.

(4) Average interest rate over the next 25 years will be 15%.

APPENDIX C

CALCULATION OF THE COSTS OF VESSEL FINANCING

(ii) 63' Crabber

YEAR	ANNUAL GROSS INCOME	ACCUMULATED YEARLY REVENUE (20%) DEDUCTED AT SOURCE	ACCUMULATED YEARLY (7½%) INTEREST		ANNUAL INSURANCE PREMIUM	PAYMENT AGAINST CAPITAL	OUTSTANDING CAPITAL 608 000
1	230 039	46 007		45 600	7 000		
2		50 609	6 593	45 600	"		
3		55 669	8 584	45 600	"		608 000
4		61 236	5 515	45 600	"	3 121	604 879
5		67 360		45 366	"	14 994	589 885
6		74 096		44 241	"	22 855	567 030
7		81 505		42 527	"	31 978	535 052
8		89 655		40 129	"	42 526	492 526
9		98 621		36 939	"	54 682	437 844
10		108 483		32 838	"	68 645	369 199
11		119 331		27 689	"	84 642	284 557
12		131 264		21 342	"	102 922	181 635
13		144 391		13 622	"	123 769	57 866
14		158 830		4 339	"	57 866	0
			Interest Total: $491 432				

Notes: See Appendix A

APPENDIX D

CALCULATION OF THE COSTS OF VESSEL FINANCING

(iii) 45' Multipurpose Boat

YEAR	ANNUAL GROSS INCOME*	ACCUMULATED YEARLY (7½%) INTEREST	ANNUAL INSURANCE PREMIUM	PAYMENT AGAINST CAPITAL	OUTSTANDING CAPITAL 35 625
1	31 735	267.20	400	3,562.50	
2		"	"	"	
3		"	"	"	
4		"	"	"	
5		"	"	"	
6		"	"	"	
7		"	"	"	
8		"	"	"	
9		"	"	"	
10		"	"	"	
11					0
12		Total Interest: $2,672			

* Average revenue from multipurpose boats at Caraquet, Richibucto, Cap Pelé and Cape Tormentine.

Notes: Since this is an inshore boat, it is financed with 10 equal payments, which include simple interest. Otherwise, see notes with Appendix A.

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